REMARKS

Favorable reconsideration is respectfully requested.

Upon entry of the above amendment, the claims will be 13-19.

The above amendment is responsive to points set forth in the Official Action.

In this regard, the term "sheet of" in claim 13 has been deleted and the feature of claim 14 has been incorporated into claim 13.

Further, the feature of claim 20 has been incorporated into claim 19.

Thus, no new matter or new issues are raised by the above amendment, and accordingly, entry is respectfully requested.

Claims 11-13 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (U.S. 4,751,146) in view of Hanson (U.S. 5,863,446).

This rejection is respectfully traversed.

Maeda et al. (U.S. 4,751,146) discloses various structures as a laminate printed circuit board, as pointed out by the rejection. However, Maeda et al. does not disclose or suggest that holes are made in a copper-clad laminate by irradiating a copper foil surface with a carbon dioxide gas laser by means of the pulse oscillation thereof, that the hole-making auxiliary material, which is laminated on a copper foil surface under heat and pressure is used, and that the hole-making auxiliary material is a water-soluble resin composition containing a predetermined amount of at least one powder selected from the group consisting of a metal compound powder, a carbon powder and metal powder.

Therefore, Maeda et al. is unsuggestive of the present auxiliary material and backup sheet in both function and composition.

Hanson (U.S. 5,863,446) discloses a method for drilling blind-vias in a laminated substrate, where the blind-vias have via entrances of 75 μm or less (column 3, lines 11-13). Hanson states the preferred lasers are pulsed solid state lasers such as the frequency-tripled ND:YAG laser emitting at a 355 nm wavelength or a frequency-quadrupled ND:YAG laser emitting at a 266 nm wavelength (column 11, lines 14-19).

In the invention of Hanson, a through hole and/or a blind via hole having a diameter of 25 to 75 μm is made using a ND:YAG laser (column 5, line 55). The ND:YAG laser can produce a hole with a diameter of 25 to 75 μm without using an auxiliary material. However, a carbon dioxide gas laser cannot make a hole without an auxiliary material.

Hanson discloses a method for enhancing the quality of a via entrance, whether the via is a blind-via or a through-via, by applying a polymeric photo-absorptive layer on an exposed top surface of the laminated substrate (column 4, lines 23-27).

The method for making a blind-via of Hanson is disclosed in detail from column 12, line 11 to column 14, line 29. As seen in Figure 5A, laminate substrate 42 includes a conductive layer 46 having a preformed aperture 46a formed at the location where blind-via 44 is to be formed. Laminate substrate 42 includes dielectric layers and conductive layers. Aperture 46a is formed by conventional means, such as by a chemical etching process, so that dielectric layer 48 is exposed. Conductive layer 46 is coated with a photo-absorptive material, and then the photo-absorptive materials are imaged with a pattern for aperture 46a. The imaged photo-absorptive layer is developed and the exposed portion of conductive layer 46 is chemically etched to form aperture 46a (column 12, lines 16-29).

In column 12, lines 38-42, Hanson discloses "With photo-absorptive layer 56 in place, substrate 42 is then placed on the positioning table 34 of Fig. 3. The laser beam is positioned so that the laser focal spot is focused to a predetermined spot size of aperture 46a where blind-via 44 is to be drilled."

Thus, Hanson's method of making a hole in which an aperture is made in a predetermined position of a photo-absorptive layer formed on a conductive layer, an aperture is made in the exposed portion of the conductive layer by etching, and the exposed dielectric layer is irradiated with a laser to form a blind via.

The reason for using the photo-absorptive layer is described in column 13, lines 3-9. That is, the material from dielectric layer 48 that is ablated during laser drilling is vaporized and pulled through a local source of exhaust, or is redeposited on polymeric photo-adsorptive layer 56 surrounding aperture 46a. After via 44 achieves the depth shown in Fig. 5a, photo-absorptive

layer 56 and the ablated material redeposited thereon are removed using known techniques, such chemical stripping.

In column 20, lines 38-40, Hanson describes "To form the through-via of Fig. 7A, the laser beam is preferably applied to substrate 60 in a trepanned motion as was described with respect to formation of the blind-via." This description evidently means that the method of making a hole in the case of through-vias is the same as the method of making a blind-via. Further, Hanson describes the function of the photo-absorptive layer in column 20, lines 50-58 as follows:

> When through-via 62 is drilled through to the bottom side of substrate 60, minimal deposit on the sidewalls occurs due to the high UV-VIS (ultraviolet visible) absorptivity of the polymer coating on the via exit and conductive layer 86 after ablation-redeposit. Once drilling is complete, conductive layer 86 is separated from substrate 60 and photo-absorptive layer 68 is stripped away... Also, photo-absorptive coating 66 is stripped...

Furthermore, the function of the polymeric photo-absorptive layer is described in column 4, lines 29-34. That is, ablated materials formed by laser drilling the substrate are redeposited on the photo-absorptive layer surrounding the via. The photo-absorptive layer and the ablated material are then removed.

As discussed above, in the invention of Hanson, the polymeric photo-absorptive layer is not irradiated with a laser. After forming apertures in the above photo-absorptive layer and a surface layer metal foil, the laser irradiation is carried out. Then, the redeposited material formed by the laser irradiation is removed by removal of the above photo-absorptive layer.

In contrast, the auxiliary material for making a hole with a laser, provided by the present invention, is for making it possible to make a hole by irradiating a copper foil surface with a carbon dioxide gas laser.

The auxiliary material of the present invention is completely and unobviously different from the polymeric photo-absorptive material of Hanson, and there is no disclosure thereon which suggests the present invention.

Thus, there is nothing in Hanson which overcomes the above deficiencies of Maeda, nor is there any motivation to combine them to arrive at a material or sheet having the presently recited utility.

Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. in view of Hanson, as stated rejection of claims 11-13 and 19-20 above and further in view of Gannon (U.S. 5,916,401).

This rejection is also respectfully traversed.

Maeda and Hanson are discussed above.

There is nothing in Gannon which suggests combining it with Maeda and Hanson to achieve the above-discussed objectives of the present invention.

As a final point, the Examiner is requested to initial the last reference on PTO-1449 of July 27, 2003 or explain why it was not initialed.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

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